

MEMORANDUM FOR RECORD: Trip Report to Oxford County, ME Emergency Management Agency 6 March 2004

1. On Saturday, 6 March 2004, I traveled to South Paris, ME to meet with representatives of Oxford County, Maine Emergency Management agencies. This trip was made in response to a request for technical support from Maine Emergency Management as part of the Northeast Ice Jam Monitoring Project.
2. The primary ice jam problems in Oxford County are associated with the Androscoggin River and its tributaries. Ice jams occurred earlier this winter in Bethel, Canton, and Rumford, ME. In each case, the ice jams are a recurring problem and cause backwater flooding on tributaries, flood houses, and cause the closure of major state highways (see 18 December trip report by Steven Daly and Andrew Tuthill, 22 December, 30 December, and 8-9 January trip reports by Andrew Tuthill). NAE and CRREL provided technical support to Oxford County during similar ice jam flooding that occurred during the winter of 2001. The 2001 flooding led Dan Schorr of the Oxford County Emergency Management Agency (EMA) to request that the State EMA support the installation of flood stage and ice movement detection alert systems similar to those used on the Kennebec River that year and the system tested by CRREL at Lancaster, NH. At that time, no funds were available. In response to the recent damaging floods, the State had agreed to support the installation of such devices, and the Oxford County EMA requested our assistance in scoping the system requirements and locations.
3. Present were Dan Schorr (Oxford County EMA, 207-743-6336), Randy Warner (electronic support to Oxford County EMA and President of Warner Electronics, Inc., 207-452-2911), Jim Dymont (Canton Fire Department, 207-597-2235), and Wayne Dube (Canton Fire Department, 207-592-3043). Canton suffered the worst damages in the December 2003 ice jam event, an estimated \$2.9 Million. Based on descriptions from the 1980 New England Division 1980 Report "Section 206 Flood Plain Management Historical Ice Jam Flooding in Maine, New Hampshire, and Vermont", the 2003 ice event was a virtual duplicate of the January 1978 ice event.
4. I provided the following materials: a list of vendors of commercial-off-the-shelf (COTS) flood alert equipment from the ALERT Systems Organization (<http://www.alertsystems.org/>) (see attachment 1), copies of ERDC-CRREL Tech Note 03-2, "Early Warning Flood Stage Monitoring Equipment" available at <http://www.crrel.usace.army.mil/techpub/CRREL_Reports/reports/TN03-2.pdf>, and printouts of the Lancaster web site from that morning (<https://webcam.crrel.usace.army.mil/lancaster/>). The IEIEB includes a table of equipment requirements for a variety of conditions (e.g., hard power, hard phone, solar power, cellular phone, RF transmission).
5. My original thought, which I shared with the group, was that a COTS system which included data streaming to the web and automatic alerts would be the most useful for them. A COTS system would require annual maintenance fees but would relieve the local EMA personnel of maintaining a web-based data acquisition system themselves. The group was under the impression that the state would fund the capital costs for equipment purchase and acquisition, but that the local town or County EMA's would be responsible

for the annual O&M. After pointing out that even the cost of a phone line would be difficult for them to justify, the best route appeared to be for us to put together a system that they could maintain. Randy felt that the presence of the microwave backbone throughout Oxford County would allow the system to be based on RF transmission of data to a base station located in the Oxford County EMA Communications Building, with automated telephone transmission of messages from there using existing lines. I told him I would have Chris Williams discuss this possibility with him.

6. After some discussion, the group agreed that the probable best solution would be the following: we would put together a set of equipment specifications for a flood alert system usable for both ice jam and open-water floods; they would purchase the equipment; we would build the systems, provide training and a user's manual; we would assist them with installation; we would set up a web page for them; and they would run the web page. Some provision for trouble-shooting during the first year would be necessary. The systems would include stage, water temperature, and whatever internal monitoring is required to evaluate system performance remotely. Robustness, ease of maintenance, and clear oral and visual communication are important design factors. The web site ideally would have a map of the area of the river basin that showed the location of the alert systems and some indication of rising/falling. The data would be obtained by clicking on each location. Note that the Oxford EAM web page is hosted by Megalink.net and they have a 10MB limit; it may be necessary for the State to host the web page.
7. Locations of the systems were then discussed. Assuming RF would be suitable, the constraint of nearness to telephone lines was removed. Next, installation of the pressure transducers requires that they be placed in some type of standpipe, preferably near the riverbed. Installation cost and permitting led us to consider installation at bridges. The four locations that the Oxford County EMA desired to have alert systems were Canton, Bethel, Rumford, and Mexico. Each location is described below, from easiest to hardest. Quick surveys would be required to check that each location is suitable stage-wise.
 - a. Bethel: The Route 2 Bridge near Bethel Adventure Systems. Dan found a copy of the Bethel Flood Insurance Study, and from the profiles, it appears that this placement would provide information for the Androscoggin River as well as Adler Brook and the Pleasant River, which experience backwater from the Androscoggin. Bethel is the most likely place for the ice motion detectors, since anecdotal evidence suggests ice begins to move here first.
 - b. Rumford: The Route 232 Bridge. Surveys should tell us whether this would also provide information for the Concord River downstream and the Ellis River upstream. (Is there a Flood Insurance Study? Dan couldn't find this).
 - c. Mexico: The Route 2 Bridge on the Swift River. This location would provide backwater information from the Swift River as well as the Androscoggin.
 - d. Canton: The new Gilbertville Bridge, upstream from Whitney Brook. It looks from the large maps Dan had available that this location would cover the Androscoggin jam at Stevens Island and Whitney Brook, where the worst damages are. Again, a survey is required to verify that this location will provide observations of the areas of interest.
8. The Flood Insurance Study provided an opportunity to discuss the FEMA Map Modernization program. I explained that areas prone to ice jam flooding, the map modernization should include an ice hydraulic analysis as well as an open-water

hydraulic analysis to be sure that the regulatory floodplains reflect the influence of ice. As an example, CRREL recently provided technical support to the Map Modernization study of the upper Connecticut River. At ice jam locations, the ice-affected stage-frequency curve clearly impacted the 10-, 50-, and 100- year flood frequencies and often affected frequencies between the 100-year and 500-year. An example of an ice-affected stage-frequency from that study is included in attachment 2.

9. Finally, I also brought copies of the “Introduction to Ice Jams” and “Ice Jam Mitigation” PowerPoint presentations and went over these with the group.
10. During the drive over and back, I observed the following ice conditions: solid but deteriorating ice on the Connecticut, Moose, Israel, Peabody, Androscoggin, and Wild Rivers. The Moose River in Gorham was open, as were portions of the Saco River near Fryeburg, ME.

Respectfully Submitted,

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Research Hydraulic Engineer
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Attachment 1: List of Vendors:

ALERT

Vendors

There are a growing number of vendors who offer hardware and / or software for the operation of ALERT and IFLOWS systems. If you are aware of any other vendors which merit inclusion in this list please notify the [WebPage Administrator](#):

- A-Tek (800)-308-4835 : Complete/partial systems
- [Aerotron-Repcro Systems \(ARS\)](#) (800)950-5633 : Radio telemetry equipment
- [Advanced Measurements and Controls, Inc](#) Tel: (425)489-9887, Fax: (425)489-0548: Supplying instrumentation and systems to the hydrological community for the past eight years
- The Brown Computer Company (919)-361-5118 : QNX tape backup systems
- [CadhamHayes Systems](#) (613)789-8649 NewLeaf (r) software for data collection and management of time-series data
- [Campbell Scientific](#) (435)753-2342 : Flood warning systems, Dataloggers, hydrological and meteorological monitoring stations.
- [Community Alert Network \(CAN\)](#) (800)992-2331 : Warning notifications via telephone
- [DEC Data Systems](#) : Forecasting & ALERT Software
- [Design Analysis Associates](#) : (435)753-2212 : Environmental Monitoring, Dataloggers, and sensors
- [Data Transmission Network Corp. \(DTN\)](#) (806)794-3258 : Radar, satellite
- [David Ford Consulting Engineers, Inc.](#) (916)447-8779 : Hydrologic Engineering, Water Resource Planning and Flood Warning
- [DIAD, Inc.](#) (303)774-2033 : Environmental monitoring, system integration, maintenance, software and real-time data
- [Distinctive AFWS Designs Inc.](#) (828)683-1566 : Hydrometeorologic monitoring, system integration, maintenance, and designs
- [Druck, Inc.](#) (203)746-0400 : Pressure Transducers
- [ELPRO Technologies Pty. Ltd.](#) 61-7-3352-4533 : ALERT hardware (Australia)
- [Eco Harmony Technologies](#) USA (805)641-9966:Hydrological, Meteorological, & Environmental Monitoring Equipment
- [Firnspiegel](#) (530)546-6172 : Atmospheric & Snow Research
- [Fluid Data Systems](#) (800)773-5843 : Bubbler gauges
- [Fox Weather](#) (805)985-8743 : Meteorological services
- [Futuretech Electronics Pty. Ltd.](#) 61-3-9568-1944 : Complete/partial systems (Australia)
- [Hemlock Technical Services](#) (425)739-9253 : Radio frequency licensing assistance for Federal and state flood warning programs.
- [Henz Meteorological Services](#) (303)458-1464 : Meteorological services
- [Hi-Go](#) (800)550-8535 : Emergency management communications, wireless video
- [High Sierra Electronics / ACRO](#) (800)275-2080 : Complete/partial systems
- [HydroLynx Systems, Inc.](#) (formerly NovaLynx Systems) (916)374-1800 : Complete/partial

systems

- [HYDRON Systems](#) (858)547-8028 : Hydrologic Time Series Data Management software and services.
- [Intermountain Environmental, Inc.](#) (800)948-6236 : ALERT hardware, dataloggers
- [JBS Energy, Inc. /JBS Instruments](#) (916)372-0534:
- [Kavouras, Inc.](#) (800)328-2278 : Radar, satellite, forecasting
- Keller PSI (800)328-3665 : Pressure Transducers
- Michael Mark Systems (717)766-0364 : Forecasting software
- [NEXRAIN](#) (916)988-2771 : Flood risk management service, ALERT system audits, Radar-rainfall analysis
- [NovaLynx Corp.](#) (800)668-2596 : Meteorological systems-649-7275 x209
- [Paroscientific, Inc.](#) (206)883-8700 : Bubbler gauges
- [QNX](#) : (800)676-0566 : Intel real-time, multi-tasking operating system
- [Qualimetrics, Inc.](#) (800)824-5873 : Weather sensors
- [RCS Communications](#) (540)223-4435 : IFLOWS/ALERT Systems
- [Remote Systems Integration](#) (901)532-8269: AWOS, ALERT, Agricultural instruments & networks, etc
- [Riverside Technology, Inc.](#) (970)484-7573 : Riverside Technology, Inc. provides Hydrologic Simulation, Forecasting, Flood Warning, and Data Management software
- [Roper Associates](#) (916)988-7950 : Complete/partial systems
- Schaaf & Wheeler (408)297-4848 : Design/installation/support
- [SM Technical](#) (510)232-0575 : System design
- Surface Water Data (916)726-3282
- [Sutron Corp.](#) (703)406-2800 : Sensors, Data processing software, modeling software
- [TECMES S.R.L.](#) Ph: 0054-11-4431-7206 : Our firm is established in Argentina since 1975, being its main activity the development, supply and installation of hydrometeorological equipment.
- [Turner Collie & Braden](#) (512)457-7829 : ALERT System Design, Flood Modeling, Emergency Planning, Water Availability Modeling (full service Civil consulting)
- [Unisys](#) (800)445-5929 : Radar, satellite, forecasting
- [Vaisala Sunnyvale Operations](#) (408)734-9640 : Flood warning and environmental monitoring systems, network communication: satellite, radio, modem, voice and cell phone plus GOES Direct Readout Ground Station and UBS base station. All these products have been used by agencies in the flood warning community.
- [Vitel](#) (703)968-7575 : Complete/partial systems
- WaterMark Engineering (916)727-3413
- Western Hydrologic Systems (530)885-2480
- [WSI](#) (508)670-5000 : Radar w/ALERT links, satellite, forecasting
- [xStreamMeasures](#) : Software that computes surface water information

Attachment 2: Example of Ice-Affected Stage-Frequency Curve from Upper Connecticut River Map Modernization Study

